410 Rec'd PCT/PTO 14 SEP 2000

FORM PTO-1390 (RLV 12-29-99) U S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: 0745/62947/NHZ

U.S APPLICATION NO. (If known, see 37 CFR 1.5): 09/646199

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE00/00129	14 January 2000	14 January 1999

TITLE OF INVENTION: METHOD FOR AUTOMATICALLY DESIGNING CELLULAR MOBILE RADIOTELEPHONE NETWORKS

APPLICANT(S) FOR DO/EO/US: Jurgen CLEMENS, Dr. Wolf MENDE and Dr. Norbert SCHULTZE

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. [ ] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. [X] This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. [X] A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. [ ] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. [ ] is transmitted herewith (required only if not transmitted by the International Bureau).
   b. [ ] has been transmitted by the International Bureau.
   c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US).
6. [X] A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. [ ] Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. [ ] are transmitted herewith (required only if not transmitted by the International Bureau).
   b. [ ] have been transmitted by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [ ] have not been made and will not be made.
8. [ ] A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. [X] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [ ] A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern document(s) or information included:

11. [ ] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [X] A FIRST preliminary amendment.
    [ ] A SECOND or SUBSEQUENT preliminary amendment.
14. [ ] A substitute specification.
15. [ ] A change of power of attorney and/or address letter.
16. [X] Other items or information: A copy of the International Application, as published, including International Search Report and translation thereof, Express Mail Certificate of Mailing dated September 14, 2000, bearing Label No. EJ900 851 149US.

U.S. APPLICATION NO (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
09/646199	PCT/DE00/00129	0745/62947/NHZ

17. [X] The following fees are submitted:	CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **$970.00**		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **$840.00**		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$690.00**		
International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$670.00**		
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) **$96.00**		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$970.00	
Surcharge of **$130.00** for furnishing the oath or declaration later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$0	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	6 - 20 =	0	X **$18.00**	$0	
Independent claims	1 - 3 =	0	X **$78.00**	$0	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ **$260.00**	$0	
TOTAL OF ABOVE CALCULATIONS =				$970.00	
Reduction of 1/2 for filing by small entity, if applicable. A Small Entity Statement must also by filed (Note 37 CFR 1.9, 1.27, 1.28).				$	
SUBTOTAL =				$	
Processing fee of **$130.00** for furnishing the English translation later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +				$	
TOTAL NATIONAL FEE =				$	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$	
TOTAL FEES ENCLOSED =				$970.00	
				Amount to be refunded:	$
				charged:	$

a. [X] A check in the amount of $970.00 to cover the above fees is enclosed.

b. [ ] Please charge my Deposit Account No. _____ in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. [X] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 03-3125. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO

Norman H. Zivin
COOPER & DUNHAM LLP
1185 Avenue of the Americas
New York, New York 10036

SIGNATURE

Norman H. Zivin
NAME

25,385
REGISTRATION NUMBER

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Dkt. 62947

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	Jurgen CLEMENS, Dr. Wolf MENDE and Dr. Norbert SCHULTZE
Serial No.	:	Not Yet Known
Filed	:	Herewith
For	:	METHOD FOR AUTOMATICALLY DESIGNING CELLULAR MOBILE RADIOTELEPHONE NETWORKS

Assistant Commissioner of Patents
BOX PCT
Washington, D.C. 20231

Sir:

PRELIMINARY AMENDMENT

Please delete the claims, and substitute new claims 1 through 6, as follows:

-- 1. A method for automatically designing cellular mobile radio telephone networks, wherein, from existing planning data of implemented, planned or abstract cellular mobile radio telephone networks or subnetworks and the space-related data of their planning areas and the space-related data of a new planning area, a design of the cellular mobile radio telephone network or subnetwork for the new planning area is automatically generated by processing the relations between the space-related reference and planning data and application of coordinate and angle transformations to the site coordinates of the base stations and main beam directions of the antennas of the base stations of the reference data.

2. A method according to claim 1, wherein the quality of the network design is assessed by quantifying the relations between space-related reference and planning data.

3. A method according to claim 1, wherein the space-related planning data are acquired, stored, tested and processed.

4. A method according to claim 1, wherein the space-related planning data are represented as one or multi-dimensional features and/or parameters and are kept stored in a database.

5. A method according to claim 1, wherein the space-related and network-related reference data are kept stored in a database and are represented as one or multi-dimensional features and/or parameters.

6. A method according to claim 1, wherein, without necessary human intervention, for a mobile radio telephone network or subnetwork (N1) to be planned on a geographic area (1) a real or abstract mobile radio telephone network or subnetwork (N2) on a real or abstract geographic area (6) is changed in the space-related parameters, site coordinates and antenna main beam directions and on the geographic area (1) is substituted in the subnetwork (N1) to be planned by coordinate transformation of the geographic longitude, latitude and rotation with respect to the zero meridian at the precise instant when the features of the space-related data of the geographic areas (1) and (6) are equal or are said to be equal in accordance with a particular criterion. --

REMARKS

The claims pending in the PCT application have been amended to eliminate multiple dependent claims. New claims 1 through 6 are presented for examination.

An early and favorable examination on the merits is earnestly solicited.

Respectfully submitted,

Dated: September 14, 2000 By: _____

Norman H. Zivin
Reg. No. 25,385
c/o Cooper & Dunham LLP
1185 Avenue of the Americas
New York, New York 10036
(212) 278-0400
Attorney for Applicant

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Method for automatically designing cellular mobile radio telephone networks

Description

The present invention relates to a method for automatically designing cellular mobile radio telephone networks in accordance with the features of the preamble of patent claim 1.

It is the aim of practical radio network planning for designing cellular mobile radio telephone networks to offer the highest possible quality of service to the largest number of subscribers and it has to be based on predetermined boundary conditions such as, for example, wave propagation characteristics, availability of fixed transmitter sites, useable frequency spectrum, traffic volume to be expected, traffic distribution etc.

In the initial period of mobile radio telephony, the radio network planning was essentially performed manually by a radio network planner. Due to the increase in size and efficiency of networks, efforts were aimed at automating more and more substeps of the planning process. This required powerful computers which have become generally available only in recent times. Known methods for the automatic design,

automated planning and/or optimization of cellular mobile radio telephony networks taking into consideration the geographic conditions and/or the behavior of subscribers within the planning region, which have been implemented or are in development, are based on the totality or on parts of the following general method which is shown diagrammatically in Figure 4.

In a first step, the space-related data of the planning area are preprocessed. Space-related data are understood to be, for example, the space-related radio traffic distribution to be expected, the radio traffic density, topographical data, traffic routes (roads, railway lines) etc. In Figure 4, a planning area 1 considered is shown diagrammatically, which is subdivided into individual grid squares 2. For each grid square, a predicted traffic density, i.e. a traffic density to be expected, is shown. The darker the gray coloration shown, the higher the expected traffic density.

In a second step, the space-related data are represented as condensed and normalized features which are shown as normalized density points 3 in the example. The condensed and normalized features are processed by means of algorithms for calculating the geographic position of the sites for the base stations 4 of the mobile radio telephone network.

In a third step, finally, the sites of the base stations 4 and of the condensed normalized features are processed by means of algorithms for calculating the parameters of the

base stations of the mobile radio telephone network. These parameters are, among others, transmitter power, frequencies, antenna parameters, etc. The proposed coverage areas 5 of the individual base stations 4 are shown, for example, at the bottom in Figure 4.

This results in a rough planning model which now must be optimized by means of manual work. The example still contains gaps between coverage areas 5 of base stations 4 which must be closed by further planning measures such as, e.g. setting up additional base station sites, increases in transmitter powers etc..

The known methods can either only be used for part-tasks of the automatic network design or contain fundamental problems:

As yet, no automatic method is known which, by means of its application, generates a complete network design, the quality of which is comparable to results of manual radio network planning.

Furthermore, no automatic method is known which, by means of its design, can assess the quality of the results of the automatic network design in comparison with a network or subnetwork planned manually or in operation and can demonstrate these quality levels in the result.

No automatic method is known which, by means of its design, can be applied for different mobile radio telephone standards (GSM, DCS 1800, CDMA, analogue standards, future standards) in parallel and without changing the operations.

No automatic method is known, either, which, by means of its design, achieves the reuse of complete manual planning results and planning experience for new mobile radio telephone networks to be planned by means of automatic operations.

No automatic method is known which, by means of its design, takes into consideration the particular features of different system technologies in the design of networks or subnetworks.

Furthermore, no automatic method is known which, by means of its design, achieves the design of mobile radio telephone networks which combine different mobile radio telephone standards (e.g. GSM 900 and DCS 1800).

The present invention is based on the object of proposing a method for automatically designing cellular mobile radio telephone networks which generates a complete network design, the quality of which is comparable to results of manual radio network planning.

This object is achieved by the characterizing features of claim 1.

The invention is based on a method which automatically generates a design of the cellular mobile radio telephone network or subnetwork for the new planning area from previously produced planning data of implemented, planned or abstract cellular mobile radio telephone networks or subnetworks and the space-related data of their planning areas (reference data) and the space-related data of a new planning area (space-related planning data) by processing the relations between the space-related reference and planning data and application of coordinate and angle transformations to the site coordinates of the base stations and main beam directions of the antennas of base stations of the reference data.

An significant advantage of the method according to the invention is that by this means a realistic complete network design (complete network data and network parameters), which can be used directly for quantification of the investment and planning expenditure and for other planning processing by the user is generated automatically.

Furthermore, the networks or subnetworks generated are automatically assessed by means of quality levels by the method described. This ensures that transparent information

on the planning outlay of the further processing of the network design are provided to the user of the method.

A further advantage consists in achieving a selective, automated reuse of manual planning results and the normalized storage of know-how. This leads to a considerably reduced work- and computing load.

Furthermore, the method according to the invention achieves a significant quality improvement of the "synthetic network" function of radio network planning tools by taking into consideration the space-related data of the planning area (e.g. a synthetic network adapted to traffic).

Furthermore, the method described provides for a new class of analysis functions of a radio network planning tool in that network areas with similar or corresponding space-related conditions can be automatically compared.

In addition, the method according to the invention achieves network designs for different mobile radio telephone standards and system technologies by using identically structured reference data of the preproduced networks without changing the operations.

To prepare and carry out the method described, operations, activities and methods are used which are known to an expert

and, therefore, will not be explained in greater detail here. These are, e.g.:

- the acquisition, storage, testing and processing of space-related grid and/or vector data,
- the calculation of one- or multi-dimensional features of space-related grid and/or vector data,
- the calculation of the similarity of objects with multi-dimensional feature vectors including cluster methods, fuzzy and neuroalgorithms,
- all aspects of the standards of cellular mobile radio telephone networks, the system technology and the technology of terminals of cellular mobile radio telephone networks, and
- all aspects of models and methods for propagation, coverage, interference, frequency demand, frequency planning and the capacity of cellular mobile radio telephone networks and of the measurement data in the operation of a cellular mobile radio telephone network.

Advantageous embodiments and further developments of the invention are the subject-matter of the dependent patent claims.

Due to the calculations of similarity between the reference data and the planning data, which form the basis of the method, it is possible to assess the quality of the network

design by quantifying the relations between space-related reference and planning data. The quality or, respectively, the correspondence of part-areas of the network design to part-areas of the reference network can be expressed, for example, by a number between 0 and 1, where 0 indicates no correspondence and 1 an identical correspondence between the data of the reference area and the planning area. This enables the network planner to estimate rapidly and relatively accurately the expenditure and the costs of any manual post-processing of the network design found which may be required.

In the text which follows, the invention is explained in greater detail by means of an illustrative embodiment, referring to a number of figures in the drawings. The drawings and their description will reveal further features and advantages of the invention.

Figure 1 shows a diagrammatic representation of the method according to the invention;

Figure 2 shows diagrammatically the structure of the technical implementation of the method;

Figure 3 shows a flow chart of the most important method steps;

Figure 4 generally shows the necessary method steps in the (part-)automated radio network planning according to the prior art.

According to the invention, the following considerations are used as a basis:
Two geographic areas having identical space-related features can be supplied by mobile radio telephone networks or subnetworks which are identical apart from the space-related parameters (coordinates of the base stations, main beam directions of the antennas). From this it follows that two geographic areas having identical space-related features can be represented by identical space-related data contents which can be processed by machine.

The preliminary considerations are based on the fact that the number of cellular mobile radio telephone networks which have been planned and have been implemented by network operators such as T-Mobil is very large. If, in theory, this number tends towards infinity, there is already a planning area having identical space-related data contents for each new planning area. The mobile radio telephone network existing locally can be processed for the network design for the new planning area by transformation of the space-related parameters.
Assuming a realistic number of planned and implemented mobile radio telephone networks of a network operator such as

T-Mobil, a planning area with identical space-related data contents already exists for each new planning area precisely if, in theory, the size of the area of the planning area tends toward zero or, respectively, approaches the resolution of the space-related data (e.g. 5 × 5 seconds of arc). The smaller the planning area and the subnetwork connected with this geographical area, the greater the probability that there are identities in the space-related data contents.

The realistic, practical application takes place when the space-related data contents of an existing planning area and a new planning area are considered as being identical by means of the introduction of a similarity criterion. The degree of similarity of the space-related data contents is a quality level of the conformability of the design for the new cellular mobile radio telephone network or subnetwork.

Figure 1 diagrammatically shows the sequence of the method according to the invention.

The space-related planning data of planning area 1 are known. The planning data have been previously determined by means of known methods and measures and can contain the following:

- elevation data,
- land utilization data,
- traffic routes (road data, railway data, shipping lines),

- traffic data (e.g. distribution of traffic volumes in the grid squares 2),
- distribution of subscribers,
- distribution of population

or special, suitable subsets of this total set.

The network data 10 which describe the required network or subnetwork are not yet known and are to be determined by the method.

From radio network planning operations in a planning area 6 considered, which have already been carried out, the network data and parameters are known and represent a corresponding set of reference data which are connected to the planning areas of these preproduced, planned or implemented mobile radio telephone networks or subnetworks via one-to-one relation: these data also contain:

- elevation data,
- land utilization data,
- traffic routes (road data, railway data, shipping lines),
- traffic data (e.g. distribution of traffic volumes in grid squares 7),
- distribution of subscribers,
- distribution of population

or special, suitable subsets of this total set.

This provides reference data which contain both the subset of the network data and network parameters of the preproduced mobile radio telephone networks (e.g. sites of the base stations 9 and resultant field strength distributions 8) and, connected via one-to-one relations, the subset of the space-related data of their planning areas.

According to the invention, operations 13 are now performed which implement a conversion from the state of preproduced mobile radio telephone networks or subnetworks 6 into the state of network design for a new planning area 1.
The part-operations are:

- Feature calculation of space-related reference and planning data 7 which are represented as one- or multi-dimensional features or parameters.
- Similarity calculation of multidimensional features of the planning area 1 and the planning area 6,
- Mapping of the sites of the base stations of reference area 6 onto planning area 1 by coordinate transformation of the sites of base stations 9 into geographical longitude, latitude and rotation related to the zero meridian,
- Angle transformation of the main beam directions of the antennas of base stations 9 for rotations related to the zero meridian.

This results in a network design which consists of planning data and parameters of the automatically generated, complete mobile radio telephone network or subnetwork (site of the base stations 12, parameters for calculating the field strength distribution 11, etc.). The more closely the reference area and its space-related data correspond to the planning area and its space-related data, the greater the correspondence of the network data of the network design to the data of the reference network design.

According to Figure 2, therefore, this results in a method for automatically designing cellular mobile radio telephone networks, in which

- without necessary human intervention,
- for a mobile radio telephone network or subnetwork N1 to be planned,
- on a geographic area 1,
- a real or abstract mobile radio telephone network or subnetwork N2, on a real or abstract geographic area 6,
- is changed in the space-related parameters site coordinates of base stations 9, 12 and antenna main beam directions,
- and on the geographic area 1 is substituted by coordinate transformation of the geographical longitude, latitude and rotation with respect to the zero meridian in network N1,

- at the precise instant, when the features of the space-related data of the geographic areas 1 and 6 are equal or are set to be equal in accordance with a particular criterion.

To implement the method according to the invention technically, computer hardware and software of a radio network planning tool including the input/output peripherals, corresponding to the prior art, must be supplemented by programs for implementing the operations of the method according to the invention.
Storage media corresponding to the prior art must be provided for space-related grid and vector data.
Furthermore, storage media corresponding to the prior art must be provided for planning data and parameters of planned or implemented cellular mobile radio telephone networks or subnetworks. The data of the reference data can be called up in appropriate databases.

Figure 3 again describes the steps of the automated planning method in detail:

(1) Reading the space-related reference data r1 to rn:
The space-related data of the reference networks (in each case represented by their space-related reference data and their reference network data) are accessed.

(2) Calculating features Mr1 to Mrn:
For each reference network ri, i=1 to n, a feature Mri is calculated. Both general prior art methods of pattern recognition and data condensation and normalized storage techniques for the space-related data as matrix or node/edge vector without special data condensations can be used.

(3) Reading the space-related planning data rp:
The space-related data of the planning area are accessed

(4) Calculating the features Mp:
Calculations according to Step (2) for the space-related planning data

(5) Calculating feature Mri with the shortest distance to feature Mp:
The feature Mri (reference network data) having the shortest distance to feature Mp (planning data) in the feature space is calculated by using methods corresponding to the prior art for calculating the similarity of objects having multidimensional feature vectors (e.g. cluster method).
The associated reference network Nri is determined via index i due to the one-to-one relation between space-related reference data and reference network data.

(6) Reading the data of reference network Nri:
The network data and parameters Nr1 to Nrn of the reference network are accessed

(7) Transformation of the site coordinates Nri → Np
Establishing geographic congruence of the space-related reference data i and planning data p by displacement (geographic longitude and latitude) and rotation with respect to the zero meridian. Analogous coordinate transformation of the sites of the base stations (application addition, subtraction, circular function).

(8) Transformation of the main beam directions Nri → Np
Analogously to step (7), transformation of the angles of the main beam directions of the antennas of the base stations with respect to the geographic location from Nri to Np (application of addition and subtraction).

(9) Outputting the data of the network design Np:
Storing the data of the network design Np on the storage medium
Output of the distance of the features Mri (space-related reference data) and Mp (space-related planning data) in the multidimensional feature space as quality level for the conformability of the automatically generated network design Np.

Legend of drawings

1 Planning area

2 Grid square

3 Density points

4 Base station

5 Coverage area

6 Reference area

7 Grid square

8 Field strength distribution

9 Base station

10 Network data to be determined

11 Field strength distribution

12 Base station

13 Operations

Patent Claims

1. A method for automatically designing cellular mobile radio telephone networks, wherein, from existing planning data of implemented, planned or abstract cellular mobile radio telephone networks or subnetworks and the space-related data of their planning areas and the space-related data of a new planning area, a design of the cellular mobile radio telephone network or subnetwork for the new planning area is automatically generated by processing the relations between the space-related reference and planning data and application of coordinate and angle transformations to the site coordinates of the base stations and main beam directions of the antennas of the base stations of the reference data.

2. The method as claimed in claim 1, wherein the quality of the network design is assessed by quantifying the relations between space-related reference and planning data.

3. The method as claimed in claim 1 or 2, wherein the space-related planning are acquired, stored, tested and processed in the known manner.

4. The method as claimed in one of claims 1 to 3, wherein the space-related planning data are represented as one- or multi-dimensional features and/or parameters and are kept stored in a database.

5. The method as claimed in one of claims 1 to 4, wherein the space-related and network-related reference data are kept stored in a database and are represented as one- or multi-dimensional features and/or parameters.

6. The method as claimed in one of claims 1 to 5, wherein, without necessary human intervention, for a mobile radio telephone network or subnetwork (N1) to be planned on a geographic area (1) a real or abstract mobile radio telephone network or subnetwork (N2) on a real or abstract geographic area (6) is changed in the space-related parameters, site coordinates and antenna main beam directions and on the geographic area (1) is substituted in the subnetwork (N1) to be planned by coordinate transformation of the geographic longitude, latitude and rotation with respect to the zero meridian at the precise instant when the features of the space-related data of the geographic areas (1) and (6) are equal or are said to be equal in accordance with a particular criterion.

Key to figures

Fig. 1

1 Reference data

2 Space-related data

3 Network data

2 Space-related data

3 Network data

4 **Operations**

5 Planning data

6 (Stage 1)

7 Network design

8 (Stage 2)

Fig. 2

1 Storage medium

2 Space-related planning data rp of planning area A1

1 Storage medium

3 Space-related reference data r_1 - r_n

1 Storage medium

4 Reference network data Nr1 - Nrn

5 Calculating base of the programs

6 Operations

1 Storage medium

7 Network design N1 for planning area A1

Fig. 3

1 Space-related reference data r1 to rn

2 Calculating features Mr1 to Mrn

3 Reading space-related planning data rp

4 Calculating feature Mp

5 Calculating Mri with shortest distance to Mp

6 Reading reference network Nri

7 Transforming site coordination, Nri > NP

8 Transforming main beam directions, Nri > Np

9 Outputting Np, outputting quality level

ersatzblatt (regel 26)

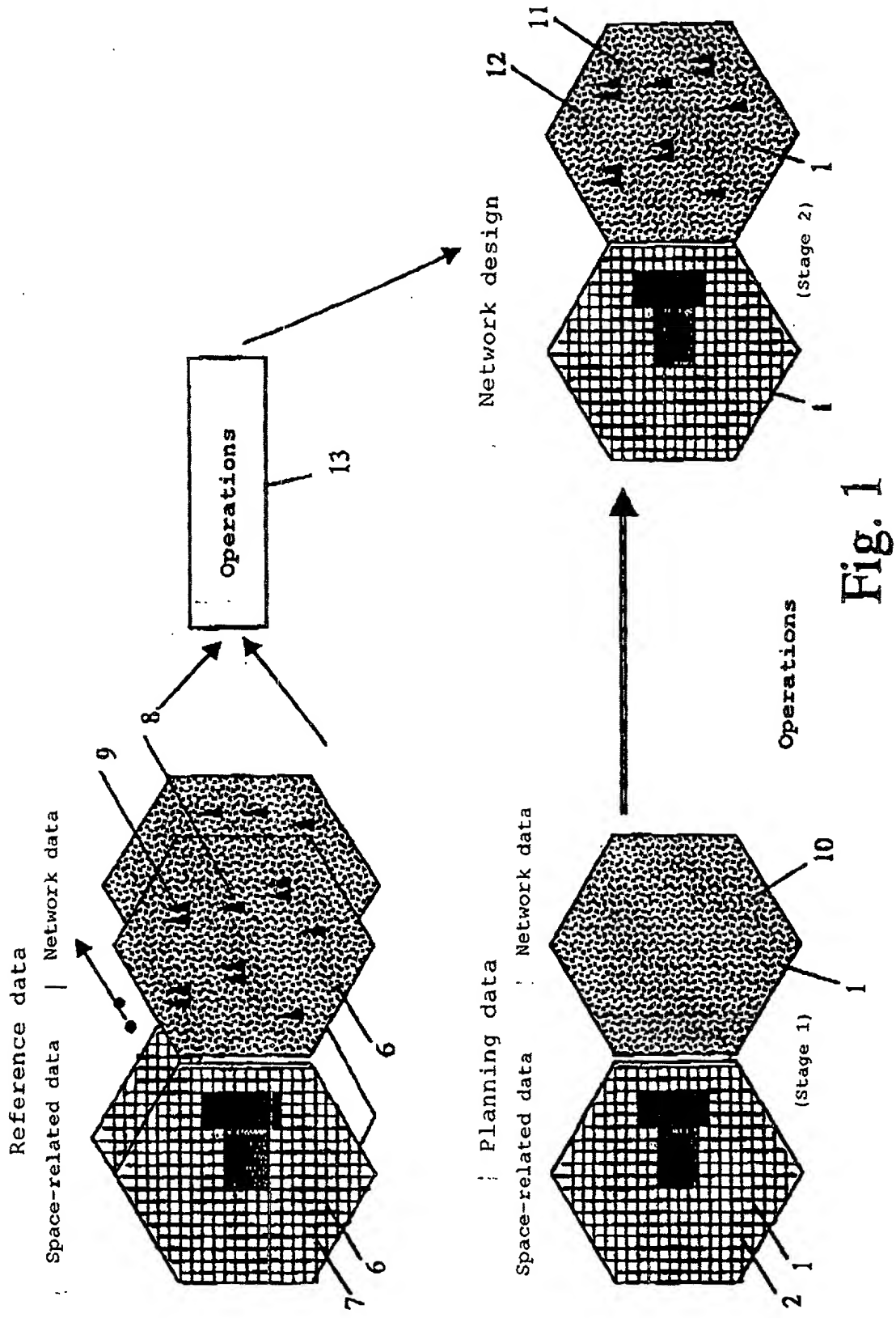

Reference data
Space-related data
Network data
Planning data
Space-related data
Network data
Operations
Network design
(Stage 1)
(Stage 2)
1
2
6
7
8
9
10
11
12
13

Fig. 1

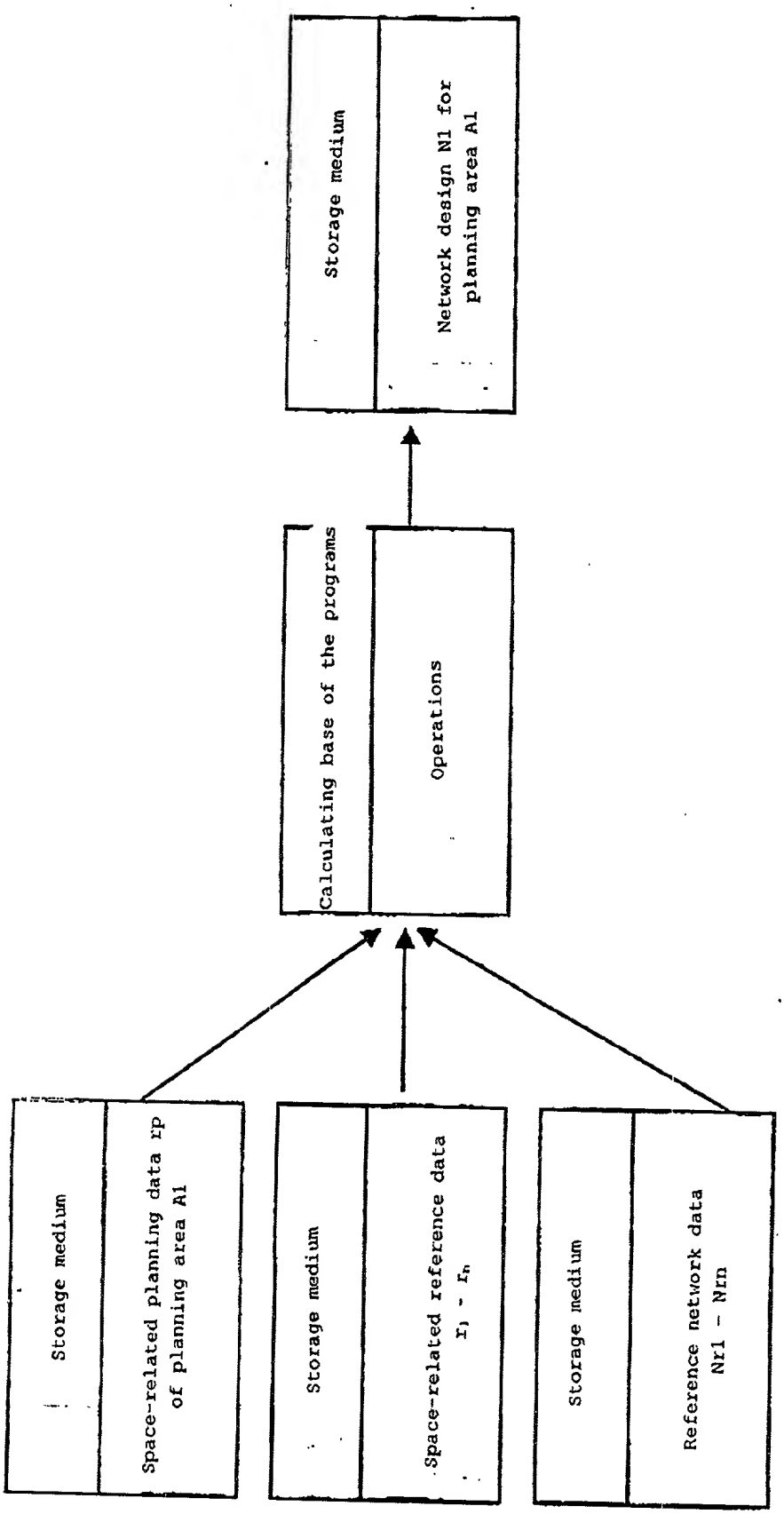
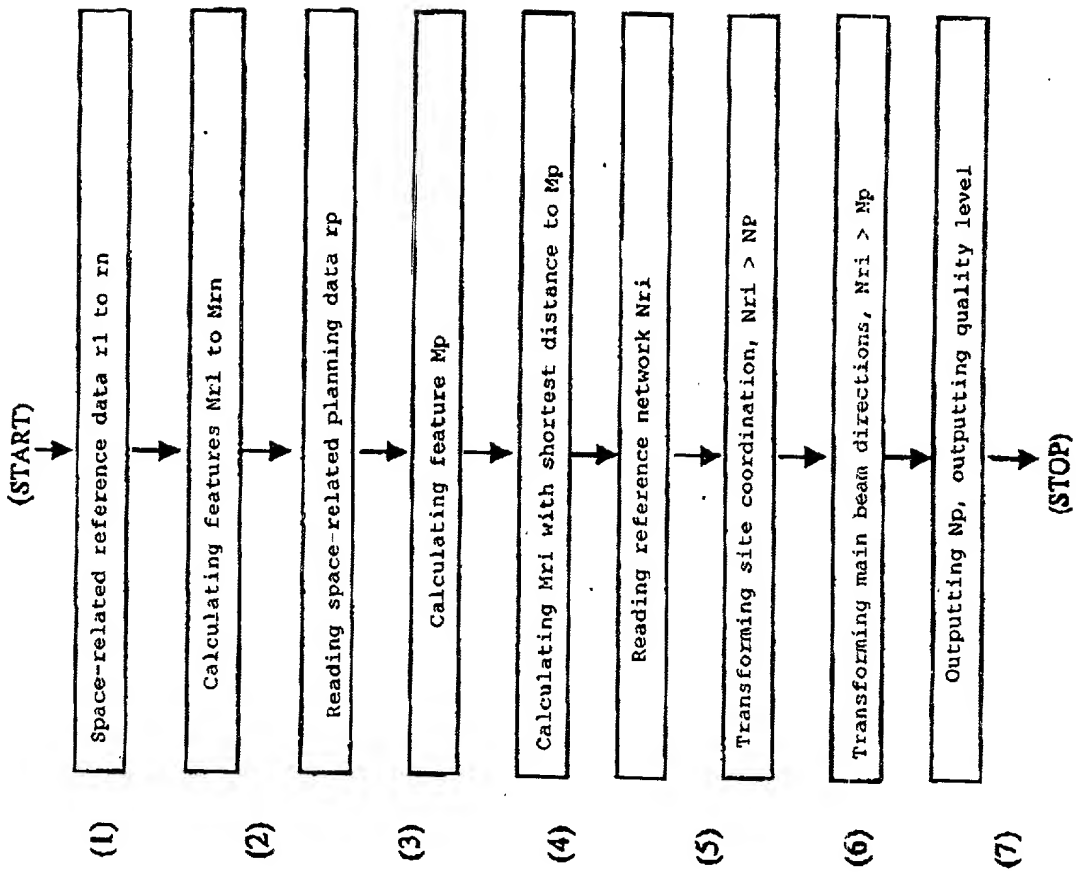

Storage medium
Network design N1 for planning area A1
Calculating base of the programs
Operations
Storage medium
Space-related planning data rp of planning area A1
Storage medium
Space-related reference data r1 - rn
Storage medium
Reference network data Nr1 - Nrn

Fig. 2

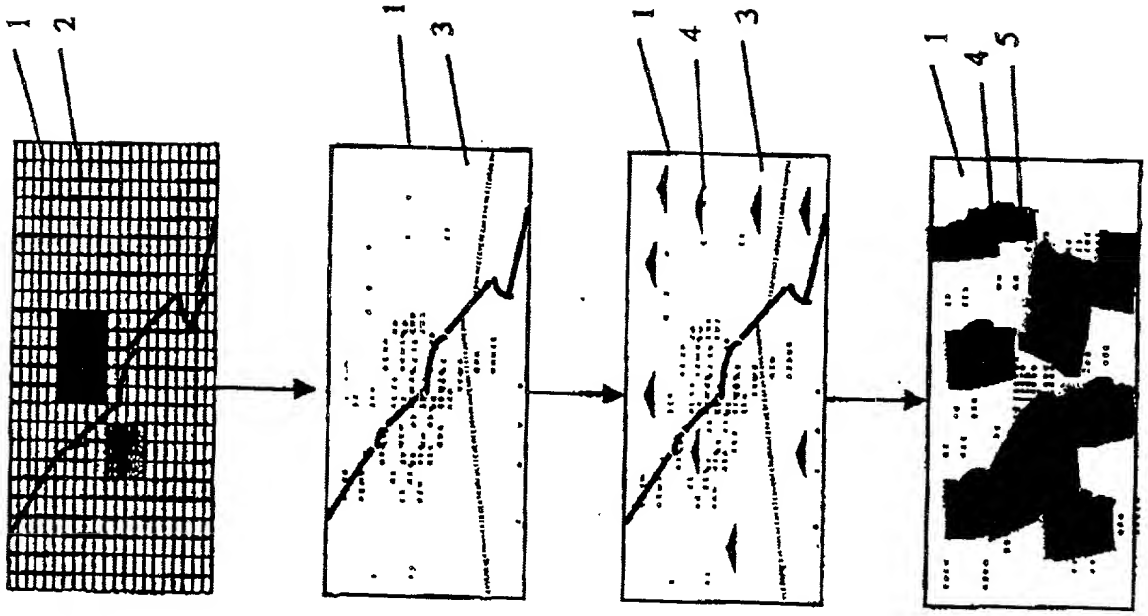
Fig. 3


(START)
Space-related reference data r1 to rn
Calculating features Mr1 to Mrn
Reading space-related planning data rp
Calculating feature Mp
Calculating Mri with shortest distance to Mp
Reading reference network Nri
Transforming site coordination, Nri > NP
Transforming main beam directions, Nri > Np
Outputting Np, outputting quality level
(STOP)
(1)
(2)
(3)
(4)
(5)
(6)
(7)

WO 00/42799 PCT/DE00/00129

09/646199

Fig. 4



Dkt. 62947

DECLARATION AND POWER OF ATTORNEY

As a below-named inventors, We hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

METHOD FOR AUTOMATICALLY DESIGNING CELLULAR MOBILE RADIOTELEPHONE NETWORKS
(Title of Invention)

the specification of which:
(check one)

___ *is attached hereto.*

_X_ *was filed on* *September 14, 2000*

Application Serial No. *09/646,199*

and was amended _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information of which I am aware which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			*Priority Claimed*	
Number	*Country*	*Filing Date*	*Yes*	*No*
199 01 247.4	*GERMANY*	*January 14, 1999*	*Yes*	___
PCT/DE00/00129	*PCT*	*January 14, 2000*	*Yes*	___
___	___	___	___	___
___	___	___	___	___

Declaration and Power of Attorney

Application Serial No.	*Filing Date*	*Status*

(7)

And I hereby appoint ***Norman H. Zivin (Reg. No. 25,385); John P. White (Reg. No. 28,678); Ivan S. Kavrukov (Reg. No. 25,161); Christopher C. Dunham (Reg. No. 22,031); Robert D. Katz (Reg. No. 30,141); Peter J. Phillips (Reg. No. 29,691); and Wendy E. Miller (Reg. No. 35,615)*** *and each of them, all c/o Cooper & Dunham LLP of 1185 Avenue of the Americas, New York, New York 10036 (Tel. 212 278-0400), my attorneys, each with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the patent, to transact all business in the Patent and Trademark Office connected herewith and to file any International Applications which are based thereon under the provisions of the Patent Cooperation Treaty.*

Please address all communications, and direct all telephone calls, regarding this application to:

Norman H. Zivin *Reg. No.* ***25,385***
Cooper & Dunham LLP
1185 Avenue of the Americas
New York, New York 10036
Tel. (212) 278-0400

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

1-00

Full name of sole or first joint inventor Jurgen CLEMENS

Inventor's signature Jurgen Clemens

Citizenship Germany *Date of signature* 13 Oct 2000

Residence In Neuwerk 11

D-21680 Stade, GERMANY DEX

Post Office Address SAME AS RESIDENCE

2-00

Full name of joint inventor (if any) Dr. Wolf MENDE

Inventor's signature Wolf Mende

Citizenship Germany *Date of signature* 29 SEP 2000

Residence Monheimstr. 29

D-53229 Bonn, GERMANY DEX

Post Office Address SAME AS RESIDENCE

Declaration and Power of Attorney

3-00

Full name of joint inventor (if any) Dr. Norbert SCHULTZE

Inventor's signature Norbert Schultze

Citizenship Germany *Date of signature* 29.09.2000

Residence ~~Sperbergweg 28~~ Edith-Stein-Str. 17

D-53859 Niederkassel, GERMANY DEX

Post Office Address SAME AS RESIDENCE

DOCKET: 66+5150